Fall vs Spring Nitrogen Fertilizer for Direct-Seeded Spring Barley

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Objective

Compare the effect of fall versus spring direct-shank application of nitrogen fertilizer on yield, test weight and residue production of direct-seeded spring barley after winter wheat

Location: Colfax, WA
Average annual precipitation: 17 inches
Previous crop: 75 bu/A winter wheat
Rotation: Winter wheat, spring barley, fallow
Soil: Athena silt loam

Treatments

Fall - direct-shank application of 60 lb N/A and 12 lb sulfur/A in undisturbed winter wheat stubble with the McGregor Straw Boss on November 8, 1993

Spring - direct-shank application of 60 lb N/A and 12 lb S/A in undisturbed winter wheat stubble with the McGregor Straw Boss on February 24, 1994

Comments

Soil samples were taken to a depth of 4 feet in the trial area in early November before the fall fertilizer application. Nitrogen content included: nitrate nitrogen of 9, 9, 19, and 7 lb/A in the 1st 2nd, 3rd, and 4th foot depths, respectively; ammonium nitrogen of 12 lb/A in the top foot; and an estimated nitrogen mineralization from soil organic matter of 47 lb/A (1.87% organic matter). Total estimated available nitrogen for the next crop was 103 lb/A.

All plots were direct-seeded to a spring barley varietal mix of Camelot/Steptoe on March 7 with a conventional International double-disk drill with 7-inch row spacings. Each treatment was replicated 4 times. Plot width was 32 feet. Plot lengths were 640 feet for two replications and 1,400 feet for the other two replications. Preharvest samples of two rows one meter long were clipped near ground level one week before harvest. Preharvest sample data included number of heads, total biomass weight, grain weight, and 1000 kernel weight. The center 24 ft of each plot was harvested on August 3 with a combine and weights were measured using portable truck scales. Grain samples were taken for test weight determinations.

Data

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Rep 1</th>
<th>Rep 2</th>
<th>Rep 3</th>
<th>Rep 4</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>1340</td>
<td>1602</td>
<td>----</td>
<td>1773</td>
<td>1538a</td>
</tr>
<tr>
<td>Spring</td>
<td>1481</td>
<td>1661</td>
<td>1722</td>
<td>1917</td>
<td>1695a</td>
</tr>
<tr>
<td>LSD (5%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>226</td>
</tr>
<tr>
<td>CV</td>
<td></td>
<td></td>
<td></td>
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<td>4.0%</td>
</tr>
</tbody>
</table>

Conclusion
There were no significant differences in test weight or in number of heads, total biomass, or 1000 kernel weight. The combination of poor seed-soil contact and dry spring conditions adversely affected the stand. Use of an air drill would probably have improved the stand under this fertilizer and direct-seed system. The input costs of direct fertilizer application and direct seeding are far below that of conventional tillage. The dry growing season minimized the possibility of treatment differences. Movement of nitrogen fertilizer overwinter was probably minimal.